

Temperature is the single most measured Physical Quantity throughout Science

The properties of PTFE present an astonishing number of creative solutions that can be applied to temperature measurement problems. The material does not contaminate the media and it cannot be contaminated by it. This allows PTFE solutions to be specified where no other material will do. A number of technologies can be applied to temperature measurement but generally they are confined to thermocouples and resistance thermometers. The Resistance Thermometer is usually a Pt100 or Pt1000 device to European specification EN 60751 but other specifications can be accommodated.

Mastco also supplies probes that use thermistors or other types of sensors. Thermistors vary so widely between manufacturers that they do not have internationally accepted standards. Mastco has supplied integrated circuit based sensors for special applications in the past (such as the Dallas DS 1820 which gives a digital output). These require special considerations in manufacture but can produce advanced solutions to particular problems.

Mastco has manufactured and supplied a wide range of PTFE temperature probes for use in:

Semiconductor Industry
Process Industry
Food Processing
Biotechnology
Combinatorial Chemistry
Chemical Storage
Tissue Storage
Cryogenic Storage
Batteries
Plating
Instrumentation
Clean Rooms

Probe construction is basically similar for thermocouples or Resistance Thermometers. Initial differences are that thermocouples use the lead-in wire to create the sensor whereas Resistance Thermometers require a separate detector (illustration above shows construction of a Pt100 probe). The sensor is soldered or welded onto the ends of the PTFE lead-in wire. Connection can be two, three or four wire, depending on the required accuracy. The wire may or may not be shielded to prevent unwanted RF radiation interference. The soldered/welded connection is insulated using PTFE (insulation not shown for clarity).

In order to give the probe some rigidity and mechanical protection the sensor and wire may be enclosed in a stainless steel tube. To ensure good thermal transfer a Heat Transfer Paste surrounds the sensor and is in thermal contact with the steel tube (paste not shown for clarity). The assembly is then encapsulated in PTFE to complete the probe. The PTFE body and the PTFE lead-in cable are molecularly bonded to form a leak-proof seal.

The outer dimensions of the probe can be modified for a number of reasons. This is carried out using molding and basic machining techniques as described in the PTFE section. Quick response times are absolutely necessary for many applications. Contact Mastco for information and design criteria on obtaining better response times when using our PTFE encapsulated temperature probes.

PTFE has more outstanding properties than any other known material

In many circumstances the choice of PTFE is not entirely parametric. The good looks and clean lines of Mastco's probes and comparable cost to a metallic construction often mean that clients prefer PTFE even in non-critical applications.

For critical chemical/moisture proof applications the superior seal between the body of the probe and the lead-in cable is the deciding factor. No other sealing method (resins, silicones, cements or other adhesives) produces such a superior seal. The upper temperature limit for total immersion is 250°C, which rules out resins and silicones for long-term use.

Apart from the specialized laboratory probes there is no such thing as a 'Standard Probe'. Mastco manufactures probes to order and will discuss your requirements prior to manufacture.

We have a wealth of experience in temperature measurement and can confidently recommend and help you design probes for your particular application.

Mastco introduced the world's first integrated PTFE sensor/transmitter probe for the semiconductor industry. This single unit allows the measurement of ultra-clean chemicals by means of a wire wound sensor with signal conditioning built right into the probe body. The probe screws into the wall of the delivery system with no need for thermowells or immersion tubes.

The accuracy and thermal response characteristics of the probe are designed to match the system requirements.

Sensors for use in laboratory situations are designed to integrate into regular glassware. Probes can be designed with different tapers and different shaft lengths. Adapters are also available so that regular straight probes can be used with laboratory glassware.

Using PTFE probes in the laboratory means that chemical processes will not be influenced by the presence of the probe.